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Joseph S Tripoli
Thomson Licensing Inc
PO Box 5312
Princeton, NJ 08543-5312

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| LAI, ANDREW | |

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| *Office Action Summary* | **Application No.** 10/518,670 | **Applicant(s)** CHRISTENSEN ET AL. |
|---|---|---|
| | **Examiner** ANDREW LAI | **Art Unit** 2616 |

***-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --***

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *01 July 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *20 and 21* is/are allowed.

6)☒ Claim(s) *1-4,6-9 and 11-19* is/are rejected.

7)☒ Claim(s) *5 and 10* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

## DETAILED ACTION

### *Eexaminer's Note*

Throughout this Office Action, unless otherwise noted, the following notations are used for identifying the place of cited texts in a reference:

c:m-n: "column c lines m-n" for (usually) a US patent;
p.p&m-n: "page p line m-n" for (usually) a foreign patent or paten application
[p]/m-n: "paragraph p lines m-n" for (usually) a US patent application publication

Note also that in the following discussion the term "digital-audio" is used where necessary for Applicant's "digital audio". This is purely for the convenience of concise and combined writing where "digital audio data" is presented together with "digital data".

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-4, 6-9, 17 and 18 rejected under 35 U.S.C. 103(a) as being unpatentable over Boduch et al (US 6,667,954, Boduch hereinafter) in view of Humphrey et al (US 6,246,681, Humphrey hereinafter).

Boduch provides a "method and apparatus for selecting the better of two or more copies of any given cell from the received cell streams" (2:28-30) comprising the following features:

- **<u>With respect to Independent claims 1/18</u>**

**Regarding claim 1 / 18**, Boduch discloses *a fault-tolerant router* (see “a cell-oriented redundant switching system”, Abstract line 3 and fig. 1), *comprising:*

*a first router matrix card* (fig. 1 item 107 and see “there are two copies of a redundant switch network, switch network copy 107”, 3:38-39), *said first router matrix card receiving N input digital-audio / digital data streams* (fig. 1 item 105 depicted as *input* to “copy 107” and see “signals 105 … are characterized as composite cell streams”, 3:48-49, which input multiple "composite cell streams" must be of an integer number *N*) *and generating, from N said input digital-audio / digital data streams, a first set of M output digital-audio / digital streams* (fig. 1 item 111 depicted as *output* from “copy 107” and see “signals … 111 … are characterized as composite cell streams”, 3:48-49, which output multiple “composite cell streams” again must be of an integer number *M* that may or may not be equal to *N* depending on implementation, and see more specifically “After signal 105 is input to switch network copy 107, the signal is routed through switch network copy 107 and output as signal 111”, 3:59-62), *wherein M and N are integers* (inherently so because the above cited multiple numbers of input/output “composite cell streams" cannot be fractional numbers).

*a second router matrix card* (fig. 1 item 108 and see “there are two copies of a redundant switch network, … and switch network copy 108”, 3:38-39), *said second router matrix card receiving said N input digital-audio / digital data streams* (fig. 1 item 106 depicted as *input* to “copy 108 and see “signals … 106 … are characterized as composite cell streams”, 3:48-49, noting also fig. 1 “Ingress Port Module 104” which “splits the signal 103 into two identical signals, signal 105 and 106”, 3:42-44) *and*

*generating, from said N input digital-audio / digital data streams, a second set of M output digital-audio / digital streams* (fig. 1 item 112 depicted as *output* from "copy 108" and see "signals … 112 … are characterized as composite cell streams", 3:48-49, and more specifically "After signal 106 is input to switch network copy 108, the signal is routed through switch network copy 108 and output as signal 112", 3:62-64);

*an output card* (fig. 1 "Egress Port Module 109") *coupled to said first router matrix card* ("copy 107") *and said second router matrix card* ("copy 108"), *said output card receiving said first set of M output digital-audio / digital streams from said first router matrix card and said second set of M output digital-audio / digital streams from said second router matrix card* (refer still to fig. 1 and see "Signals 111 and 112 are then passed to the egress port module 109", 3:64-65), *providing, as an output therefrom, a selected one of said first and second sets of M output digital-audio / digital streams* (refer still to fig. 1 and see "The egress port module 109 determines whether signal 111 or signal 112 will be sent on to the customer's network as output signal 113", 3:65-67), *and switching from said selected one of said first and second sets of M output digital-audio / digital data streams to an unselected one of said first and second sets of M output digital-audio / digital data streams based upon detecting an error in said selected one of said first and second sets of M output digital-audio / digital data streams* (still refer to figs. 1 and 2 and see "the best cell copy selection ASIC 110 invokes the copy selector 206 to select the better of the two copies of each cell to be sent on to the customer network. The term 'better' refers to the cell that arrives at egress port 109 of FIG. 1 with fewest errors, and the selection is made on a cell-by-cell basis" 10:35-40,

noting that the term <u>cell-by-cell basis</u> will inevitably involving *switching from* previously *selected streams* to previously *unselected streams*, depending on which of the two copies of the next cell has <u>fewest errors</u> in it).

- **<u>With respect to dependent claims</u>**

**Regarding claim 2**, *wherein said output card* (fig. 1 "egress port module 109") *further comprises a switching circuit* ("copy selector 206" of fig. 2, which "depicts a block diagram of the cell stream alignment best cell copy selection ASIC 110", 4:44-46, refer to fig. 1 for said ASIC 110) *coupled to receive said first set of M output digital audio data streams from said first router matrix card* (fig. 1 data stream 111 from "switch network copy 107) *and said second set of M output digital audio data streams from said second router matrix card* (fig. 1 data stream 112 from "switch network copy 108), *said switching circuit switching from said selected one of said first and second sets of M encoded output digital audio data streams to said unselected one of said first and second sets of M output digital audio data streams* (refer to fig. 2 and see "the copy selector to select the better of the two copies of each cell to be sent on to the customer network", 10:36-38) *in response to assertion of a switching signal* (refer to figs. 1 and 2 and see "the best cell copy selection ASIC 110 <u>invokes</u> the copy selector 206 to select", 10:35-36, noting that said <u>invoking</u> will have to involving in issuing an *assertion*).

**Regarding claim 3**, *wherein said output card* (fig. 1 "ASIC 110" within "egress port module 109") *further comprises: a first/second* error *check circuit* (fig. 2 "cell overhead extractor/monitor 201", which is the first circuit within the "best cell copy selection ASIC 110" of fig. 1) *coupled to receive said first/second set of M output digital*

*audio streams from said first/second router matrix card* (see “The cell overhead extractor/monitor 201 may also provide error counts from each switch network copy”, 5:2-4, noting further that Boduch also discloses “The best cell copy selection … can alternatively be implemented by discrete hardware components”, 4:5-8, implying said “cell overhead extractor/monitor 201” may be separated into discrete *first/second circuit* of two circuits, each handling *first/second set of output digital audio streams*); *and*

*a logic circuit* (a necessary *logic circuit* in said “best cell copy selection ASIC 110” for the ASIC to perform the function to be cited below) *to receive error signal from said first* error *check circuit and a second* error *check signal from said second* error *check circuit, said logic circuit determining, based upon said first* error *signal received from said first* error *check circuit and said second* error *signal receive from said second* error *check circuit, whether to assert said switching signal* (see “the best cell copy selection ASIC 110 invokes the copy selector 206 to select the better of the two copies of each cell to be sent on to the customer network. The term ‘better’ refers to the cell that arrives at egress port module 109 of FIG. 1 with fewest errors”, 10:35-39, noting that said invoke or *assert* will have to be performed necessarily by a *logic circuit* in said ASIC 110).

**Regarding claim 4**, *wherein said output card* (fig. 1 “ASIC 110” within “egress port module 109”) *further comprises: a first/second delay circuit* (fig. 2 “CDV FIFO function 204” and see “The CDV FIFO function 204 is used to absorb cell delay variation imparted by a single switch network”, 8:26-27) *coupled to receive said first/second set of M output digital audio data streams from said first/second router*

*matrix card* (noting in fig. 2 said “CDV FIFO function 204” receiving data stream 220/221, which are the same as data stream 111/112 from “switch network copies 107/108”);

*said switching circuit* (fig. 2 “copy selector 206”) *coupled to receive a first set of M output digital audio data streams from said first router matrix card and said second set of M output digital audio data streams from said second router matrix card via said first delay circuit and said second delay circuit, respectively* (refer to fig. 2 and see “the copy selector 206 to select the better of the two copies of each cell to be sent on to the customer network”, 10:36-38, and fig. 2 depicting that the selector receives data streams *via* said “CDV FIFO function 204”).

**Regarding claim 6**, *wherein said logic circuit asserts said switching signal based upon detection of said error in said selected one of said first and second sets of M output digital audio data streams* (see fig. 6B for logic at step 605 “cell from network copy A arrives with bit error status bit set to FALSE?” and the “No” branch thereof, indicating copy A has error and leading to possibly switching to copy B at step 609) *only if an error is not present in said unselected one of said first and second sets of M output digital audio data streams* (see fig. 6B for logic at step 609 in above “No” branch “cell from network copy B arrives with bit error status bit set to FALSE” and the “Yes” branch thereof, leading to step 610 “cell from copy B selected”, while the “No” branch of step 609 branching to step 607 “cell from preferred copy selected”, which “is the switch network copy from which the last cell was sent on to the customer network”, 11:57-59).

**Regarding claim 7**, *wherein said switching circuit switches back from said unselected one of said first and second sets of M output digital audio data streams to said selected one of said first and second sets of M output digital audio data streams based upon assertion of said switching signal* (see "the selection is made on a <u>cell-by-cell</u> basis", 10:39-40, which, following the steps in fig. 6B, will necessarily switch back-and-forth).

**Regarding claim 8**, *wherein said logic circuit* (the necessary *logic circuit* in said "best cell copy selection ASIC 110" for the ASIC to perform the function cited above for claim 3 and the function to be cited below) *asserts said switching signal based upon detection of an error in said unselected one of said first and second sets of output digital audio data streams* (see "the best cell copy selection ASIC 110 <u>invokes</u> the copy selector 206 to select the better of the two copies of each cell to be sent on to the customer network. The term 'better' refers to the cell that arrives at egress port module 109 of FIG. 1 with <u>fewest errors</u>", 10:35-39, noting that said <u>invoke</u> or *assert* bi-directionally: *selected* ↔ *unselected*).

**Regarding claim 9**, *wherein said logic circuit* (the necessary *logic circuit* in said "best cell copy selection ASIC 110" for the ASIC to perform the function cited above for claim 3 and the function to be cited below) *asserts said switching signal based upon detection of an error in said unselected one of said first and second sets of output digital audio data streams* (see fig. 6B for logic at step 605 "cell from network copy A arrives with bit error status bit set to FALSE?" and the "No" branch thereof, indicating copy A has error) *only if no error is present in said selected one of said first and second of*

*output digital streams* (see fig. 6B for logic at step 609 in above “No” branch “cell from network copy B arrives with bit error status bit set to FALS?” and the “Yes” branch thereof, leading to step 610 “cell from copy B selected”, while the “No” branch of step 609 branching to step 607 “cell from preferred copy selected”, which “is the switch network copy from which the last cell was sent on to the customer network”, 11:57-59).

**Regarding claim 17**, *wherein said output card is further configured to continue providing as the output therefrom the unselected one of said first and second set of M parity encoded output digital audio streams, even if no further parity is detected in said selected one of said first and second sets, unless a parity error is detected in said unselected one of said first and second sets* (see firstly ”to determine which switch network copy is the master, the CDV FIFO function 204 first determines which switch network copy is 'bad'", 9:31-33, and secondly "if only one switch network copy is bad, the bad switch network copy is the slave, and the other switch network copy is the master. If both switch network copies are bad or if both switch network copies are not bad, the title of 'master' stays with the previous master switch network copy", 9:48-52, noting that, as discussed above, the “better” copy, in this case the “master” copy, is selected for transmission *unless* the master becomes bad.)

Boduch does not disclose, <u>for all claims discussed hereinabove</u>, ***1.*** said multiple integer number *N/M input/output* “composite cell stream<u>s</u>” have *M different from N* and they, to/from said switch network copies 107/108, are <u>*parity encoded streams*</u> and/or ***2.*** said error based on which said selection/switching is made is <u>*a parity error*</u>.

However, in general *parity encoding* is a well known, well established and widely used error detection/correction technique in the art, as Newton's Telecom Dictionary (16th Edition, February 2000, ISBN # 1-57820-053-9) recites, "**Parity** A process for detecting whether bits of data (parts of characters) have been altered during transmission of the data. Since data is transmitted as a stream of bits with values of one or zero, each character of data composed of, say seven bits has another bit added to it. The value of that bit is chosen so that either the total number of one bits is always even if Even Parity error correction is to be obeyed or always Odd if Odd Parity error correction is chosen" (p.632, right column, the entry for **Parity**). Therefore, it would have been obvious, in general, for one skilled in the art at the time of the invention to have easily thought of incorporating *parity encoding* and *parity error checking*, as an alternative or addition, to Boduch already disclosed error checking/correction method in order to provide more ways of data stream selection. It should be noted that such addition would necessarily result in *M parity encoded output streams* from *N parity encoded input streams.*

Below is a particular example of use of such *parity encoding* technique.

Humphrey discloses "a system for selecting one of two or more parallel planes of data" (Abstract lines 1-2) which "allows planes to be switched on a packet-by-packet basis" (1:65-67) wherein data are generated using a "data formatter circuit 84" (10:59 and fig. 4) comprising using *parity error* checking and *parity encoding* (see fig. 4, "parity check 120" logic and "DS0 parity generation 126" circuits, noting especially the feature of 9 input streams thereto and 10 output streams therefrom.

Additionally, Humphrey also discloses various data processing cards, especially for example "data conversion" cards 128 and 130 taking *N* = 32 input streams and sending *M* = 10 output streams wherein, as expressly shown, *M* (10) *is different from N* (32), which should be noted, again, is entirely an issue of implementation requirement/need and/or design choice/option imposing no technical difficulty and/or novelty to one skilled in the art at the time of the present invention.

Therefore, it would have also been obvious, in particular, to one of ordinary skill in the art at the time of the invention to modify the method/system of Boduch by adding the particular parity generating and checking method of Humphrey to Boduch in order to provide a better system "that substantially eliminates or reduces disadvantages and problems associated with previously developed systems and methods for data plane selection", as pointed out by Humphrey (1:39-42).

3. Claims 11-16 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boduch in view of Humphrey and further in view of Hurlocker (US 6,320,860).

- **<u>With respect to Independent claims 11 and 19</u>**

Boduch provides a "method and apparatus for selecting the better of two or more copies of any given cell from the received cell streams" (2:28-30) comprising the following features:

**Regarding claim 11 / 19**, *for a router* (see "a cell-oriented redundant switching system", Abstract line 3 and fig. 1) *having an input card* (fig. 1 "ingress port module 104"), *a first router matrix card and a second router matrix card* (fig. 1 items 107 and 108 and see "there are two copies of a redundant switch network, switch network copy

107 and switch network copy 108”, 3:38-39, noting that each of said copies is fed into a “STS mapping 225” card, fig. 2, of which the structure is further detailed in fig. 4), *said input card transmitting a set of N input digital-audio / digital data streams* (refer to fig. 1 item 103 and see “a signal 103 comes into the redundant switching system 100 to an ingress port module 104. Signal 103 may be a SONET stream consisting of multiple STS-N payloads. The ingress port module 104 splits the signal 103”, 3:39-43) *to said first router matrix card and said second router matrix card* (still refer to fig. 1 and see “The ingress port module 104 splits the signal 103 into two identical signals, signal 105 and signal 106”, 3:42-44, and “signal 105 and signal 106 are passed to redundant switch network copies 107 and 108, respectively”, 3:51-52, wherein “signals 105 … are characterized as composite cell streams”, 3:48-49, which input multiple "composite cell streams" must be of an integer number *N*), *said first router matrix card outputting a first set of M output digital-audio / digital data streams and said second router matrix outputting a second, replicated set of M output digital-audio / digital data streams* (refer to fig. 1 and see “After signal 105 is input to switch network copy 107, the signal is routed through switch network copy 107 and output as signal 111. After signal 106 is input to switch network copy 107, the signal is routed through switch network copy 108 and output as signal 112”, 3:59-64, wherein “signals … 111 … are characterized as composite cell streams”, 3:48-49, which output multiple “composite cell streams” again must be of an integer number *M* that may or may not be equal to *N* depending on implementation), *a method of selecting one of said first and second sets of M output digital-audio / digital data streams as the output of said router* (refer still to fig. 1 and see

“The egress port module 109 determines whether signal 111 or signal 112 will be sent on to the customer’s network as <u>output signal</u> 113”, 3:65-67), *wherein M and N are integers* (inherently so because the above cited multiple numbers of input/output “composite cell stream<u>s</u>" cannot be fractional numbers), *comprising:*

*propagating said first set of M output digital-audio / digital data streams through at least one component of said firs router matrix card* (fig. 1 depicting input stream 105 passing through network copy 107);

*each one of said at least one component of said first router matrix card adding at least one bit of information* (refer to fig. 2 which “depicts a block diagram of the cell stream alignment best cell copy selection ASIC 110”, 4:44-45, note “Cell Over Head Extract/Monitor 201” and see “The cell overhead extractor/monitor 201 may also provide <u>error counts</u> for each stream emanating from <u>each</u> switch network <u>copy</u>”, 5:2-4, noting that said <u>error counts</u> must be based on *bit of information* being *added to said first set of data streams* by the *component* <u>prior to</u> said cell overhead extractor/monitor, as implied “the composite cell stream errors being determined by devices external to the best cell copy selection [ASIC 110 of fig. 1] itself”, 6:6-8, noting that the only possible *component* <u>external</u> thereto will have to be within “switch network copies 107 and 108” as depicted in fig. 1);

*propagating said second set of M output digital-audio / digital data streams through at least one component of said second router matrix card* (fig. 1 depicting input stream 106 passing through network copy 108);

*each one of said at least one component of said second router matrix card adding at least one bit of information* (refer to fig. 2 which “depicts a block diagram of the cell stream alignment best cell copy selection ASIC 110”, 4:44-45, note “Cell Over Head Extract/Monitor 201” and see “The cell overhead extractor/monitor 201 may also provide error counts for each stream emanating from each switch network copy”, 5:2-4, noting that said error counts must be based on *bit of information* being *added to said first set of data streams* by the *component* prior to said cell overhead extractor/monitor, as implied “the composite cell stream errors being determined by devices external to the best cell copy selection [ASIC 110 of fig. 1] itself”, 6:6-8, noting that the only possible *component* external thereto will have to be within “switch network copies 107 and 108” as depicted in fig. 1);

*selecting one of said first and second sets of M output digital-audio / digital data streams as the output of said router based upon a comparison of said at least one bit of information added to said first set of M output digital-audio / digital data streams to said at least one bit of information added to said second set of M output digital-audio / digital data streams* (still refer to figs. 1 and 2 and see “the best cell copy selection ASIC 110 invokes the copy selector 206 to select the better of the two copies of each cell to be sent on to the customer network. The term ‘better’ refers to the cell that arrives at egress port 109 of FIG. 1 with fewest errors, and the selection is made on a cell-by-cell basis” 10:35-40, noting that the term cell-by-cell basis will inevitably involving *switching from* previously *selected streams* to previously *unselected streams*, depending on which of the two copies of the next cell has fewest errors in it).

Boduch does not disclose, regarding claims 11 and 19, said multiple integer number *N/M input/output* “composite cell streams” have *M different from N* and they, to/from said switch network copies 107/108, and “cell-oriented redundant switching system” (*router*) is a ***broadcast*** router.

Humphrey discloses “a system for selecting one of two or more parallel planes of data” (Abstract lines 1-2) which “allows planes to be switched on a packet-by-packet basis” (1:65-67) consisting of an “optical fiber-capable telecommunication switch system 10 (fig. 1) further comprising:

**Regarding claims 11 / 19**, said multiple integer number *N/M input/output* “composite cell streams” have *M different from N* (fig. 4, see, for example, "data conversion” cards 128 and 130 taking *N* = 32 input streams and sending *M* = 10 output streams wherein, as expressly shown, *M* (10) *is different from N* (32). It should be noted, as a matter of fact, that whether $M = N$ or $M \neq N$ and what particular values of *M* and *N* are is entirely an issue of implementation requirement/need and/or design choice/option imposing no technical difficulty and/or novelty to one skilled in the art at the time of the present invention) *and*

said switch system being a *broadcast router* (refer to fig. 1 and see “Fiber optic connection unit 14 receives digitally encoded optical data from fiber optic conductor 18, performs broadcast switching of the data streams received from fiber optic conductor 18”, 4:5-8).

It would have also been obvious to one of ordinary skill in the art at the time of the invention to modify the method/system of Boduch by adding the broadcast feature of

Humphrey to Boduch in order to provide a better system “that substantially eliminates or reduces disadvantages and problems associated with previously developed systems and methods for data plane selection”, as pointed out by Humphrey (1:39-42).

As discussed above, Boduch discloses “provide error counts for each stream emanating from each switch network copy" reading on *each one of said at least one component of said first* and *second router matrix card adding at least on bit of information.* Boduch however does not disclose said “error counts” information being added ***to*** said first and second set of M output digital audio-data / digital streams propagating therethrough (Boduch's error count is provided, as depicted in fig. 2 therein, externally to "copy selector 206” using signal line 207 carrying "CDV FIFO status" signal).

Hurlocker discloses an invention that “is to provide ATM path switched ring switching criteria” (1:23-24) wherein path determination "comprises the steps of computing a running average of a sum of path bit-interleaved-parity (BIP) error counts for each right segment and selecting the preferred ring segment as the one having the lowest BIP error count" (1:37-40) using "ring segment OAM system management cell" (fig. 1) comprising the following features:

**Regarding claims 11 / 19**, each node adding one bit of information ***to*** said first and second set of M output digital-audio / digital data streams (note firstly fig. 1 depicting a "segment BIP" field in the "ring segment OAM system management cell", and secondly in view of fig. 2 and see for each intermediate node such as nodes 14, 16, 18 in fig. 1 "ten millisecond running average of the SONET/SDH path BIP error count is

added to the ring segment BIP count in an incoming ring segment OAM cell and the sum is used as the new ring segment BIP count in the outgoing ring segment OAM cell", 2:58-62; and finally see, in view of fig. 1 "At the output node 18, containing two BIP output processors, one 36 for path 20, on 34 for path 22, 24 and 26, a service selector can choose the better side by comparing the ring segment BIP counts. The selector can switch, for example, on loss of ring segment OAM cell or segment BIP", 2:66 – 3:3).

It would have been obvious to one of ordinary skill in the art at the time of the invention to further modify the method of Boduch by adding the in-frame error indicator of Hurlocker to Boduch in order to build more efficient and effective "solution to provide fast switching independent of the cell traffic" (Burlocker, 1:15-16).

- **With respect to Dependent claims**

Boduch discloses the following features:

**Regarding claim 12**, *wherein said at least one bit of information is comprised of at least one status bit* (see fig. 6B logic steps 605, 606 and 609 all discloses checking if "cell from network copy A/B arrives with bit error status bit set to FALSE?").

**Regarding claim 13**, *wherein said at least one bit of information is comprised of at least one health bit* (see fig. 6B logic steps 605, 606 and 609 all discloses checking if "cell from network copy A/B arrives with bit error status bit set to FALSE?", which status comprises also the condition of cell sequence number "out of seq" as depicted fig. 3 block 301).

**Regarding claim 14**, *wherein selecting one of said first and second sets of M output digital audio data streams as the output of said router further comprises:*

*determining a first/second sum by adding said at least one bit added to said first/second set of M output digital audio data streams* (refer to fig. 2 and see "The cell overhead extractor/monitor may also provide error counts for each stream emanation from each switch network copy", 5:2-4, which error counts will, as obvious to one skilled in the art, necessarily involve *determining a sum by adding said bit*).

*Selecting one of said first and second sets of N output digital audio data streams as the output of said router based upon a comparison of said first sum to said second sum* (see "the best cell copy selection ASIC 110 invokes the copy selector 206 to select the better of the two copies of each cell to be sent on to the customer network. The term 'better' refers to the cell that arrives at egress port module 109 of FIG. 1 with fewest errors", 10:35-39, noting such determination for fewest errors will have to first make *a comparison of the* error *sums* of the two streams).

**Regarding claim 15**, *the method of claim 11, and further comprising:*

*checking* a *first and second set of M output digital audio data streams for errors* (refer to fig. 2 and see "The cell overhead extractor/monitor 201 may also provide error counts for each stream emanating from each switch network copy", 5:2-4)

*selecting one of said first and second sets of M output digital audio data streams as the output of said router* (refer to fig. 1 and see "The egress port module 109 determines whether signal 111 or signal 112 will be sent on to the customer's network as out put signal 113", 3:64-67) *based upon the presence of errors in said first set of N output digital audio data streams* (refer to figs. 1 and 2 and see "the best cell copy selection ASIC 110 invokes the copy selector 206 to select the better of the two copies

of each cell to be sent on to the customer network. The term ‘better’ refers to the cell that arrives at egress port 109 of FIG. 1 with fewest errors, and the selection is made on a cell-by-cell basis” 10:35-40) *… and said comparison of said at least one bit of information added to said first set of M output digital audio data streams to said at least one bit of information added to said second set of M output digital audio data streams* (refer to fig. 6B and see steps 605, 606 and 609 showing checking and comparing “dell from network copy A or B arrives with bit error status bit set to FALSE?”).

**Regarding claim 16**, *the method of claim 15, wherein selecting one of said first and second sets of M output digital audio data streams as the output of said router further comprises:*

*determining a first/second sum by adding said at least one bit added to said first/second set of M output digital audio data streams* (refer to fig. 2 and see “The cell overhead extractor/monitor may also provide error counts for each stream emanation from each switch network copy”, 5:2-4, which error counts will, as obvious to one skilled in the art, necessarily involve *determining a sum by adding said bit*).

*selecting, one of said first and second sets of M output digital audio data streams as the output of said router* (refer to fig. 1 and see “The egress port module 109 determines whether signal 111 or signal 112 will be sent on to the customer’s network as out put signal 113”, 3:64-67) *based on … and a comparison of said first sum to said second sum* (see “the best cell copy selection ASIC 110 invokes the copy selector 206 to select the better of the two copies of each cell to be sent on to the customer network. The term ‘better’ refers to the cell that arrives at egress port module 109 of FIG. 1 with

fewest errors", 10:35-39, noting such determination for fewest errors will have to first make *a comparison of the* error *sums* of the two streams).

Boduch does not disclose the following features: regarding claim 15, *encoding parity information into said first/second set of N input digital audio data streams prior to transmission of said input digital audio data streams to said first/second router matrix of said first/second router matrix card, said first/second set of M output digital audio data streams output from said first/second router matrix being a first/second set of M parity encoded digital audio data streams; selecting parity encoded streams based upon … the presence of parity errors in said second set of N output streams*; regarding claim 16, said selecting *based upon the presence of parity errors in said first/second set of M parity encoded output data streams.*

Humphrey teaches the above features missing from Boduch, particularly:

**Regarding claim 15**, *encoding parity information into said first/second set of N input digital audio data streams prior to transmission of said input digital audio data streams to said first/second router matrix of said first/second router matrix card, said first/second set of M output digital audio data streams output from said first/second router matrix being a first/second set of M parity encoded digital audio data streams;* and *selecting parity encoded streams based upon … the presence of parity errors in said second set of N output streams.*

**Regarding claim 16**, said selecting *based upon the presence of parity errors in said first/second set of M parity encoded output data streams*

(see fig. 4 for “parity check 120” circuit and “DS0 parity generation 126” circuits, noting especially the feature of 9 input streams thereto and 10 output streams therefrom, and see further “DS-0 parity generation is performed by DS-0 parity generation circuit 126. This DS-0 format data is transmitted in a 10-bit parallel data stream from data formatter circuit 84”, 11:23-26).

Also, in general *parity encoding* is a well known, well established and widely used error detection/correction technique in the art, as Newton’s Telecom Dictionary ($16^{th}$ Edition, February 2000, ISBN # 1-57820-053-9) recites, “**Parity** A process for detecting whether bits of data (parts of characters) have been altered during transmission of the data. Since data is transmitted as a stream of bits with values of one or zero, each character of data composed of, say seven bits has another bit added to it. The value of that bit is chosen so that either the total number of one bits is always even if Even Parity error correction is to be obeyed or always Odd if Odd Parity error correction is chosen” (p.632, right column, the entry for **Parity**). Therefore, it would have been obvious, in general, for one skilled in the art at the time of the invention to have easily thought of incorporating *parity encoding* and *parity error checking*, as an alternative or addition, to Boduch already disclosed error checking/correction method in order to provide more ways of data stream selection. It should be noted that such addition would necessarily result in *M parity encoded output streams* from *N parity encoded input streams.*

It would have also been obvious, in particular, to one of ordinary skill in the art at the time of the invention to modify the method/system of Boduch by adding the

particular parity generating and checking method of Humphrey to Boduch in order to provide a better system “that substantially eliminates or reduces disadvantages and problems associated with previously developed systems and methods for data plane selection” (Humphrey, 1:39-42).

### ***Allowable Subject Matter***

4. Claims 5 and 10 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

In previous Office Action of 4/1/2008, Examiner indicated allowability and the reasons thereof for claims 5/10, which remain to be objected but would be allowable on the above cited conditions.

5. Claims 20 and 21 are allowed.

Claims 20/21, both independent claims, comprise essentially the same features of claims 5/10, in addition to other limitations of their own. Therefore, they are allowed for the same reasons for claims 5/10 in said previous Office Action.

### ***Response to Arguments***

6. Applicant's arguments filed on 7/1/2008 have been fully considered but they are not persuasive.

7. Applicant’s first argument is drawn to the feature of “router card” (NxM matrix card).

Applicant's argument in this regard is in fact directed to Examiner's previous "Response to Argument", especially page 22 thereof, by stating (Remarks page 13 second paragraph), in reference to Boduch's fig. 4 and Humphrey's fig. 4, "it is clear that these teachings by Boduch and Humphrey have no bearing on the router cards defined in claim 1" because (page 13 third paragraph) "Boduch's Figure 4 cannot be used to draw correspondence to one element of claim 1 at one time and another element of claim 1 at the same time."

Examiner agrees with the Applicant to the extent that the above statement is valid regarding Examiner's previous Response to Arguments of correlating Boduch's fig. 4 to Applicant's "router card", which correlating appears to be an error and thus is void and withdrawn.

However, in presenting Art Rejections in previous as well as this Office Actions, Examiner made it clear that Boduch's elements corresponding to Applicant's first/second "router cards" having N inputs and M outputs are in fact the "switch network copy" 107/108 of fig. 1, wherein each copy takes in an identical multiple, let's say A, number of "composite cell streams" and sends out a multiple, let's say B, number of "composite cell streams". In other words, certain integer numbers of input/output "composite cell streams" are processed by Boduch's "switch network copies", denoting such numbers as NxM or AxB makes no difference, which clearly makes that "those redundant switch networks of Boduch **are** NxM (or AxB) networks", contrary to Applicant's allegation (page 13 third paragraph lines 12-13) that they are not. The only feature that Boduch is silent about is whether or not the number of output "composite cell streams" is different from the number of input "composite cell streams", which is an

newly added limitation to the independent claims. However, Examiner provides that whether M=N or not is simply an implementation/application specific or design choice/option issue, which imposes neither technical difficulty nor novelty and it is obvious to one skilled in the art at the time of the present invention. In addition, Examiner also points out that Humphrey's invention expressly taught one example of such M≠N "router cards” comprising 32x10 "data conversion" cards 128/130, meaning each card taking in 32 streams and sending out 10 streams after conversion. It should be appreciated by one skilled in the art that Humphrey's particular numbers, N=32 and M=10, are only one specific example of the "data formatter FPGA" for the particular implementation or application requirement thereof; and thus they can be totally two other different numbers, such as those unspecified in Boduch, should the implementation or application be different.

8. Applicant's second argument directs to the feature of “parity encoded streams”.

In referring to Examiner stated obviousness of incorporating Humphrey's parity encoding and parity error checking, as an alternative or addition, into Boduch's teaching of error checking/detection, Applicant argues (page 14 second paragraph), “this suggestion is based on error. Moreover, even if Humphrey were added to Boduch in the manner suggested, the resulting combination would still not arrive at the invention defined in claim 1”. Further, Applicant alleges (page 14 third paragraph) "The error ... is that Boduch does not disclose any method or manner of either error detection or error correction" and “Boduch does not indicate where and how the presence or absence of the error is detected … Boduch lacks any teaching at all about a method for error detection."

Examiner respectfully disagrees.

First of all, Applicant’s claim 1 merely sets limitations for switching output streams between two router cards "*based upon detecting a parity error in said selected one of said first and second sets of M parity encoded output digital audio data streams*". Here, Applicant also says nothing about “how the presence or absence of the error is detected” and thus also “lacks any teaching at all about a method for error detection” and furthermore also “does not disclose any method or manner of … error correction”.

Examiner would like to point out that the claimed limitations of claim 1 are all about selecting a better set of parity encoded data streams from two sets for output based on detected parity errors thereof; it is NOT about the details ("where and how") of "a method for error detection", much less “error correction”. All is concerned is <u>avoiding</u> sending a worse stream set by selecting or switching to a better set.

Boduch discloses exactly the same selecting and switching mechanism between two "network switch copies” of “composite cell streams” based on, as expressly and clearly taught, “the best cell selection ASIC 110 invokes the copy selector 206 to select the better of the two copies of each cell to be sent on to the customer network. The term ‘better’ refers to the cell that arrives at egress port module 109 of fig. 1 <u>with fewest errors</u>, and the selection is made on a cell-by-cell basis”, 10:35-40. This clearly shows error detection, or otherwise question can be asked: how would Boduch be able to <u>count</u> which of the two “network switch copies” of the “composite cell streams” is "<u>with the fewest errors</u>” if there is no error detection mechanism? Boduch, admittedly, <u>is not concerned</u> and thus <u>does not need</u> error correction, which is the same as what the

Applicant does not do, because he [and the Applicant] is simply avoiding sending a worse data copy by selecting a better, which is also exactly the same as what the Applicant does.

Additionally, even on the issue of “where and how” for “error detection”, Boduch in fact discloses certain details (which of course is not applied to rejecting the claims because they are irrelevant), for example, Boduch says “A composite stream error exists when errors which affect all cells within a composite cell stream (such as ‘loss of cell delineation') are detected”, 6:2-5, which is an example of “how”, and “the composite cell streams errors being determined by devices external to the best cell copy selection itself", 6:6-8, which is an example of “where”.

Along the same line, Applicant further challenged the issue of identical input streams to the router cards, in view of Humphrey's one set of input streams being of odd parity and the other even parity, by stating (page 14 last line continuing into page 15) “these references in combination would cause different streams to be input to the two router cards because of the use of odd and even parity encoding”.

Examiner again respectfully disagrees.

Applicant is herein using a typical piecemeal analysis by attacking a reference individually rather than taking the combination of the references as a whole.

Boduch has already, clearly and expressly, taught two identical input sets of streams by saying "the ingress port module 104 splits the signal 103 into two identical signals, signal 105 and signal 106", 3:42-44. And as discussed above, Boduch expressly disclosed error detection and output streams selection/switch based on which

are "with fewest errors" detected/counted. Therefore, all that is needed, as an alternative or addition, for Boduch is incorporating parity encoding and parity error detection into his error detection and Humphrey readily provided such. It is obvious to one skilled in the art at the time of the invention that such alternative or addition would provide an enhancement that can further eliminate or reduce disadvantages and problems associated with prior art system and method for data sets selection, which Humphrey also mentioned. And it is also obvious to one skilled in the art to adopt only the concept of parity encoding and parity error detection but not to change Boduch's requirement of <u>two identical</u> signals because that is one of the fundamental principles thereof (otherwise later comparison, selection and switch of output streams would make no sense at all).

Furthermore, Applicant is also respectfully referred back to Newton's Telecom Dictionary (16th Edition, February 2000, ISBN # 1-57820-053-9) reciting "**Parity** A process for detecting whether bits of data (parts of characters) have been altered during transmission of the data. Since data is transmitted as a stream of bits with values of one or zero, each character of data composed of, say seven bits has another bit added to it. The value of that bit is chosen so that either the total number of one bits is always even if Even Parity error correction is to be obeyed or always Odd if Odd Parity error correction is chosen" (p.632, right column, the entry for **Parity**). This clearly demonstrated, once again, how notoriously well-known and widely used are parity encoding and parity error detection in the art. In other words, there is neither technical difficulty nor novelty for one skilled in the art to use parity as a way of error detection at all, in view of Boduch's teaching of error detection, and one is readily motivated to do because of the benefits said above.

9. Applicant's third argument is about the feature of adding a bit field in the data streams for error count purpose, in view of Hurlocker.

Applicant argues (page 16 second paragraph) "it would not have been obvious to add the error counts to the streams themselves in the manner taught by Hurlocker. The addition of such counts to the streams would certainly increase the bit count in Boduch's cells. Boduch has not shown any desire to increase the size of his cells... Unless Boduch included some desire or motivation within his own reference to include the error count data in is data streams, it is not obvious to add the teachings of Hurlocker to Boduch." (emphasis added).

Examiner respectfully disagrees.

First of all, Boduch's invention does not ban or prohibit "increase the bit count" in his cells. Therefore, adding additional bits or fields into the cells would not destroy or require substantial change/modification of the principles of Boduch.

Secondly, as Applicant admitted (page 16 second paragraph), "Boduch provides error counts for each stream" already. In view of this teaching, it is simply an obvious enhancement to directly put such "error counts" into the data stream themselves by adding an "error count" field thereto. Boduch does not have to teach this, but one skilled in the art at the time of the present invention, having the teachings of Boduch's "error counts" and Hurlocker adding "error count field" to data stream, would have been naturally prompted/motivated to combine the two with reasonable expectation of success but no technical difficulties at all because such a combination would offer a more efficient and effective solution that would provide fast switching independent of the cell traffic by replacing actually counting the number of errors each and every time when

a data stream is processed with simply reading the error count values that come with or are embedded in the data streams themselves.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANDREW LAI whose telephone number is (571)272-9741. The examiner can normally be reached on M-F 7:30-5:00 EST, Off alternative Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kwang Yao can be reached on 571-272-3182. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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/Andrew Lai/
Examiner, Art Unit 2616

/Kwang B. Yao/

Supervisory Patent Examiner, Art Unit 2616